LESSON 9 - HIGH ASPECT BFM
(Application Exercise 1 due)
Low aspect stuff is the endgame of many a furball, but how did you miraculously end up on that guy's tail in the first place? Weapons parameters, aircraft capabilities, and energy states drive the tactics we use to win the fight.

Reading:
Shaw **pp. 74-82,** pp. 98-138
11-F16 **Sec 4.9-4.9.5 (pp. 77-82)**
Bretana pp. 80-84, pp. 41-48
Problems/Questions:
Finish Application Exercise 1, Work on Problem Set 2
Objectives:
9-1 Understand what Lead Turns are.
9-2 Know the difference between a One-Circle Fight (Nose-to-Nose Turn) and a Two-Circle Fight (Nose-to-Tail Turn).

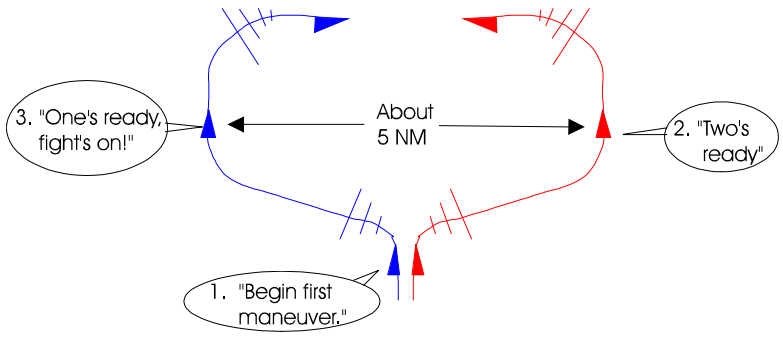
Last Time: Fight the Vertical Fight!

Today: High-Aspect BFM
Lead Turns, turning room, defenses
One-circle vs two circle fights
Out of plane maneuvers
"Vertical turning room"
Defenses
Maneuvers

Last time we discussed LABFM where attacker and defender roles were well defined. Today, we'll discuss setups where those roles have yet to be developed, where both aircraft start off in fairly neutral setups.

If neither of the aircraft have a clear advantage in position, the setup is called neutral.

Typical training setup: About 5 NM apart at the "turn-in, fight's on." Accelerate to about 500 kts => <30 sec to the merge.



Options at the merge: Turn toward, turn away, don't turn at all.

Which one depends upon your capablities vis a vis the bandit.

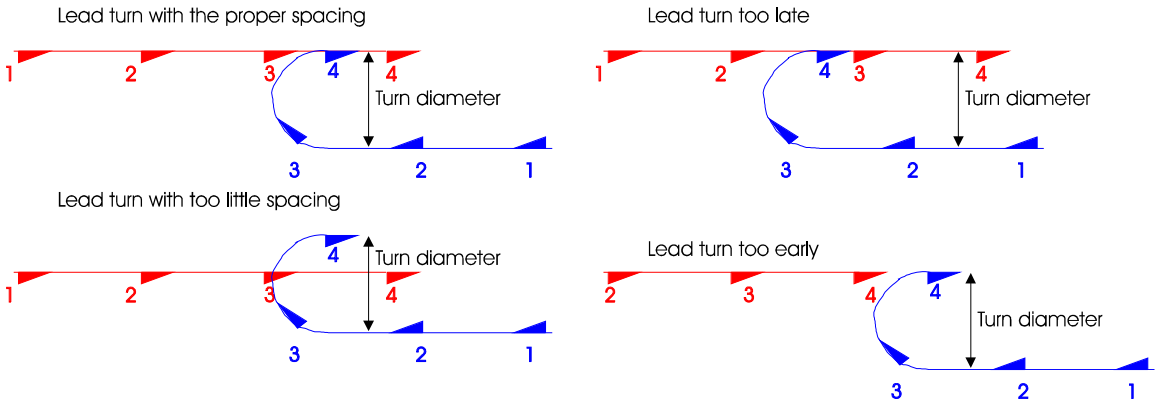
What is the goal of HABFM? To kill or separate. But to kill, you probably will have to transition to LABFM and then kill, unless you have a face shot. (ROE may prohibit a shot at the first pass until you have the VID). This says you must somehow go from neutral to offensive.

The problems with HABFM are that both the angles and range parameters for your weapons are not easily met. You need to solve both of these problems to get to a LABFM solution.

The best way to solve your angles problem is to turn early.
This is called a LEAD TURN, and its purpose is to solve your angles problem prior to the merge.

If you're unseen by the bandit, what is your best setup?

The best is to turn before the merge when you already have a built-in turn diameter of turning room between you and the bandit.



How do you counter this move if you see someone doing it to you at the last minute? Turn toward him—this takes away the turning room he's worked so hard to build.

Problems with a lead turn: Turning too early makes you fly out in front of the bandit. Turning too late puts you out of range for your weapons.

Caveat: In this course we'll use the term one-circle fight to be equivalent with the scumbag squid Shaw's term nose-to-nose fight and the term two-circle fight to be equivalent to Shaw's nose-to-tail fight.

If you can lead turn the guy with built-in turning room, do it. If he sees you and takes away your turning room, now you hit a close-in, high-aspect merge. When you pass, which way do you turn? Do you still lead turn?

Definitely lead turn most of the time (!). Start solving your angles problem before he can start solving his. The direction of turn depends upon a lot of different things. Let's look at what is meant by one- and two-circle fights.

In a one-circle fight, rate is not a real factor initially. Here, it's radius that counts. The key to winning is your range with respect to your radius at the first time your headings are parallel.

Demo on board and with sticks.

Discuss weapons parameters and how they can be used in a one-circle fight.

In a two circle fight, rate is the primary concern. How fast you can get turned around to take the first face shot is what will win or lose you the fight. This type of fight is usually a point-and-shoot face shot to a separation game.

Again, discuss weapons parameters and demo on the board.

Vertical Turning:

The important factor about who can turn better is the attacker's radius projected onto the defender's turning plane.

Show on the board and with the overhead from Shaw.

Counters to a vertical turning bandit are to put your lift vector on the attacker and pull. This puts your turning plane on his, meaning that the projection of his radius onto your plane is always the max it can be. As he goes up, so do you, so similar advantages/disadvantages happen to your rate/radius.

Maneuvers

Flat scissors = multiple lead turns, energy management. The winner of a flat sissors is usually the one who can go slower faster but maintain total energy best.

Rolling scissors: Similar concept using oblique planes for the lead turns. Hard to use unless you're used to thinking about turn performance in vertical turns (the continuously changing rate/radius/G available, etc)

Show overhead from Shaw.

Defensive Spiral: Almost like a rolling scissors going downhill. This keeps you at corner velocity longer, but has a definite limit on how low you can go. It forces the attacker to pull much harder to get a shot and it constantly changes the defender's plane of maneuver, so a tracking gunshot is very tricky.